

REMARKS

Claim Amendments

Claims 1, 4-13, 15-26, and 35-42 are pending in this application. Claims 1, 4-5, 7, 13, 15-16, and 18 are amended. Claims 35-42 are newly presented. Claims 24-26 are withdrawn. Claims 2, 3, 14, 27-30, and 32-33 are canceled without prejudice or disclaimer to the subject matter therein. Applicant reserves his right to file one or more continuations or divisionals directed to the canceled subject matter. Support for the amendments can be found throughout the specification and the original claims as filed. *See, e.g.*, paragraph [0042], [0045]-[0049], [0084], [0095], [00184], [00194], [00206], Tables 1-4, and Examples 1-3.¹ No new matter has been added.

Specification

The Office Action objects to the specification's use of hyperlinks and/or other forms of browser-executable code.² Applicant has amended the specification remove some of these hyperlinks and other forms of browser-executable code.

Applicant requests that the requirement to remove the hyperlinks in paragraphs [0046]-[0049] be withdrawn. These paragraphs reference the Pfam database. The claims recite Pfam accession numbers. Furthermore, as set forth below, the specification's teachings, including the discussion and reference to the Pfam database would assist one of skill in the art to check iso-amylase and alpha-amylase domains of a given sequence. Finally, Applicant does not intend to have these hyperlinks be active links. Accordingly, Applicant requests that the hyperlinks set forth in paragraphs [0046]-[0049] be allowed to remain in the specification. *See* M.P.E.P. § 608.01 (VII).

¹ The paragraph numbers cited herein refer to the paragraph numbers set forth in the copy of the specification, which was filed on March 30, 2006, and is attached herewith as Exhibit A. Applicant's preliminary amendment, filed on the same day, also refers to these paragraph numbers.

² Applicant notes that the paragraph numbers cited in the Office Action appear to correlate with US 2006/0253929, the publication of the instant application. However, for the sake of consistency, Applicant's amendments correlate with the specification attached herewith as Exhibit A. Applicant also points out that several of the amendments reflected herein were previously set forth in Applicant's preliminary amendment filed on March 30, 2006.

In view of the foregoing, Applicant respectfully requests withdrawal of the objection to the specification.

Drawings

The specification has been amended to provide a description of Tables 1-4, as per the Examiner's suggestion. The Table heading in paragraph [00283] has also been amended to recite "Table A."

In view of the foregoing, Applicant respectfully requests withdrawal of the objection to the specification.

Rejections Under 35 U.S.C. §112, First Paragraph

Claims 1-23 stand rejected under 35 U.S.C. §112, first paragraph, because, according to the Examiner, the specification, while being enabling for a genetically modified plant cell comprising SEQ ID NO: 3 or nucleic acid encoding SEQ ID NO: 4, does not reasonably provide enablement for any modified plant cell with a reduction in activity of any Class 3 branching enzyme, wherein the modification is a nucleic acid sequence with at least 50% identity to SEQ ID NOs: 3 or 4, or any nucleic acid that hybridizes to SEQ ID NO: 3 or a nucleic acid encoding SEQ ID NO: 4 under unspecified stringent conditions, or any antisense molecule or molecule that leads to a cosuppressive effect for any class 3 branching enzyme. *See* Office Action, pages 3-4.

Applicant respectfully traverses this rejection.

A. The Claims Require Specific Nucleic Acids Coding Specific Class 3 Branching Enzymes

Independent claims 1 and 13 have been amended to require that the plant cell is modified by introducing a foreign nucleic acid molecule which codes a class 3 branching enzyme, wherein the class 3 branching enzyme has an iso-amylase domain (Pfam acc.: PF02922) and an alpha-amylase domain (Pfam acc: PF00128), which are separated from one another by at least 100 amino acids. *See also* Claim 18 (directed to a nucleic acid coding for the same). Furthermore, claims 4, 15, and 18 have been amended to recite "80%" identity and specific hybridization conditions. Claims 5 and 16 have been amended to recite that the antisense molecule and the molecule leading to a cosuppressive effect comprise the coding region of a class 3 branching enzyme. Accordingly, the claims are directed to nucleic acids,

plant cells, plants, and methods of making plants modified with specific nucleic acids coding specific class 3 branching enzymes.

B. The Class 3 Branching Enzymes Are Defined

The Office Action contends that the specification does not detail any domains or activity that would enable one of skill in the art to recognize embodiments that are encompassed by the instant claims. *See* Office Action, pages 4-5.

Applicant respectfully disagrees. As discussed above, the class 3 branching enzymes have an iso-amylase domain (Pfam acc.: Pf02922) and an alpha-amylase domain (Pfam acc: Pf00128), which are separated from one another by at least 100 amino acids. This structural definition is disclosed and explained in the specification. *See, e.g.*, Specification, paragraphs [0043]-[0049]. The iso-amylase and alpha-amylase domains are defined by allocation to sequence domains Pfam02922 and Pfam00128 of the Pfam Database. *See Annexes 1 and 2*, attached herewith. The Pfam database is disclosed and explained in the specification. *See* Specification, paragraphs [0046]-[0049] and Tables 1-4; *see also* <http://pfam.sanger.ac.uk/>.

One of skill in the art would understand that a given nucleic acid sequence can be translated into the corresponding amino acid sequence and the amino acid sequence can be imported into the Pfam database to check the domains. For example, the Pfam motive of SEQ ID NO: 4 is provided in Annex 3. The first table on page 2 of Annex 3 shows that the iso-amylase domain ends at position 212 and the alpha-amylase domain starts at position 414. Thus, both domains are separated from one another by more than 100 amino acids. Accordingly, Applicant submits that one of skill in the art can compare any branching enzyme with the domain structures of the public Pfam database to classify whether the enzyme is a class 3 branching enzyme.

C. The Claims Recite Specific Hybridization Conditions

The Office Action objects to the recitation of “stringent conditions.” *See* Office Action, pages 5-6.

Applicant has amended claims 4, 15, and 18 to recite specific hybridization conditions. Applicant submits that one of skill in the art can make and use nucleic acids that hybridize under these conditions.

D. Starch Phenotypes

The Office Action asserts that “it would be undue experimentation to evaluate all genetic variations of all genes affecting the level of already established starch branching enzymes, let alone the newly defined class 3 branching enzymes...” Office Action, pages 6-7.

Applicant submits that the claims are not directed to such an evaluation. Rather, the claims relate to the introduction of at least one foreign nucleic acid molecule into the genome of the plant, wherein the foreign nucleic acid molecule codes a class 3 branching enzyme comprising specific domains. Applicant also points out that the specification teaches: (1) methods of demonstrating the activity of a class 3 branching enzyme; (2) methods for analyzing starch; (3) nucleic acid and amino acid sequences of a class 3 branching enzyme; and (4) a working example of genetically modified plant with reduced expression of a class 3 branching enzyme. *See* Specification, paragraphs [00260]-[00287], Examples 1-5, and the sequence listing.

In view of the foregoing, Applicant respectfully requests withdrawal of the enablement rejection.

Claims 1-22 and 24-25 stand rejected under 35 U.S.C. §112, first paragraph as allegedly failing to comply with the written description requirement.

Applicant respectfully traverses this rejection.

The stated grounds for this rejection are similar to that of the enablement rejection. Accordingly, for the same reasons discussed above, Applicant submits that the claims are adequately described. In particular, Applicant point outs that the claims relate to specific nucleic acid molecules encoding class 3 branching enzymes that are described in the specification and defined by their physical, chemical, and structural properties.

As a final matter, on page 10 of the Office Action, the Examiner states: “Without a description of which amino acids are required, there is also a lack of description as to which amino acids would need to be modified to reduce the activity of the class 3 branching enzyme.”

Applicant respectfully disagrees and submits that the claims include a description of which amino acids may be substituted and those that are critical to the function of a class 3 branching enzyme: a class 3 branching enzyme must have an iso-amylase domain and an alpha-amylase domain, which are separated from one another by at least 100 amino acids.

Claims 4 and 15, for example, list examples of nucleic acids coding for a class 3 branching enzyme. These nucleic acids must have an iso-amylase domain and an alpha-amylase domain, which are separated from one another by at least 100 amino acids. Accordingly, Applicant submits that the specification provides an adequate written description of the claims.

In view of the foregoing, Applicant respectfully requests withdrawal of the written description rejection.

Rejections Under 35 U.S.C. §102

Claims 1-17 stand rejected under 35 U.S.C. §102(b) as allegedly being anticipated by WO0170942 (“the ‘942 publication”).

Independent claims 1 and 13 have been amended to require that the plant cell is modified by a foreign nucleic acid molecule which codes a class 3 branching enzyme, wherein the class 3 branching enzyme has an iso-amylase domain (Pfam acc.: Pf02922) and an alpha-amylase domain (Pfam acc: Pf00128), which are separated from one another by at least 100 amino acids.

The ‘942 publication does not teach such modified plant cells. The ‘942 publication discloses a sequence that was deposited as Accession No. AX256072. The coding section of this sequence was translated into the corresponding amino acid sequence and a search on domains was performed in the Pfam database.

The results of the Pfam search is attached herewith as **Annex 4**. The results show that the iso-amylase domain (CBM 48) and alpha-amylase domain separated by only 68 amino acids—not by at least 100 amino acids as required by the claims. *See Annex 4* (showing that CBM 48 ends at position 286 and the alpha-amylase domain begins at position 354) Accordingly, the ‘942 publication does not teach each and every claim element.

In view of the foregoing, Applicant respectfully submit that this rejection is moot.

Claims 18-20 stand rejected under 35 U.S.C. §102(b) as allegedly being anticipated by Der Hoeven et al. (GenBank Accession No. BG886850, 2001) (“Der Hoeven”).

Claim 18 was amended to recite that the nucleic acid molecule codes for a protein with the enzymatic activity of a Class 3 branching enzyme, wherein the class 3 branching enzyme has an iso-amylase domain (Pfam acc.: Pf02922) and an alpha-amylase domain (Pfam acc: Pf00128), which are separated from one another by at least 100 amino acids.

Der Hoeven does not teach such nucleic acid molecules. Indeed, Der Hoeven fails to teach an iso-amylase domain. See **Annex 5**. Accordingly, Der Hoeven does not teach each and every claim element.

In view of the foregoing, Applicant respectfully submit that this rejection is moot.

Rejections Under 35 U.S.C. §103

Claims 1-23 stand rejected under 35 U.S.C. §103(a) as allegedly being obvious over the '942 publication, as applied to claims 1-10, 13-17 and 22 above, and further in view of WO9634968 ("the '968 publication") and further, in view of Der Hoeven as applied to claims 18-20 above.

As discussed above, neither the '942 publication nor Der Hoeven teach nucleic acid molecules that code for a Class 3 branching enzyme, wherein the class 3 branching enzyme has an iso-amylase domain (Pfam acc.: Pf02922) and an alpha-amylase domain (Pfam acc: Pf00128) which are separated from one another by at least 100 amino acids.

The '968 publication does not remedy the deficiencies of the '942 publication or Der Hoeven. Indeed, '968 publication does not teach or suggest the nucleic acids described in the claims. Accordingly, because the references, either alone or in combination, do not teach each and every claim element, Applicant respectfully submits that the rejection is moot.

CONCLUSION

It is believed that these amendments and remarks should place this application in condition for allowance. A notice to that effect is respectfully solicited. If the Examiner has any questions relating to this response or the application in general he is respectfully requested to contact the undersigned so that prosecution of this application may be expedited.

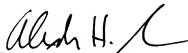
This response is being filed within the three-month time period set forth in the Office Action. Accordingly, no fees are due. However, should the USPTO determine that any fees are due in connection with this response, the Commissioner is hereby authorized to charge such fees to the undersigned's Deposit Account No. 50-0206.

Respectfully submitted,

HUNTON & WILLIAMS LLP

Date: October 22, 2008

By:



Robert M. Schulman
Registration No. 31,196

Alexander H. Spiegler
Registration No. 56,625

HUNTON & WILLIAMS LLP
Intellectual Property Department
1900 K Street, N.W., Suite 1200
Washington, D.C. 20006
(202) 955-1500 (telephone)
(202) 778-2201 (facsimile)

RMS/AHS:ltm